(19) Europäisches Patentamt
Europ an Pat nt Offic
Office uropéen d s brev ts

(11) Publication number : **0 472 505 A1**

(12) **EUROPEAN PATENT APPLICATION**

(21) Application number : **91830321.5**

(51) Int. Cl.[5] : **F16H 7/08**, B65G 23/44

(22) Date of filing : **23.07.91**

(30) Priority : **20.08.90 IT 8498490**

(43) Date of publication of application :
26.02.92 Bulletin 92/09

(84) Designated Contracting States :
AT BE CH DE DK ES FR GB GR LI LU NL SE

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(54) **An elastically deformable member, in particular a tensioning member for flexible motion-transmitting or conveyor means.**

(57) An elastically deformable member to be used in particular as a tensioning member for flexible motion-transmitting or conveyor means such as chains or belts comprises a polygonal base body (1) provided with holes (2) located on the faces thereof, to which a helical spring (3) carrying a cylindrical threaded stem (6) at the top is fastened. Disposed within the void defined by the spring (3) is a rectilinear column (4) or a chain (10) articulated at the base to the poligonal body (1) and exhibiting the cylindrical threaded stem (6) at the top. A shaped head (9) adapted to act on the flexible motion-transmitting or conveyor means can be associated with said cylindrical threaded stem (6).

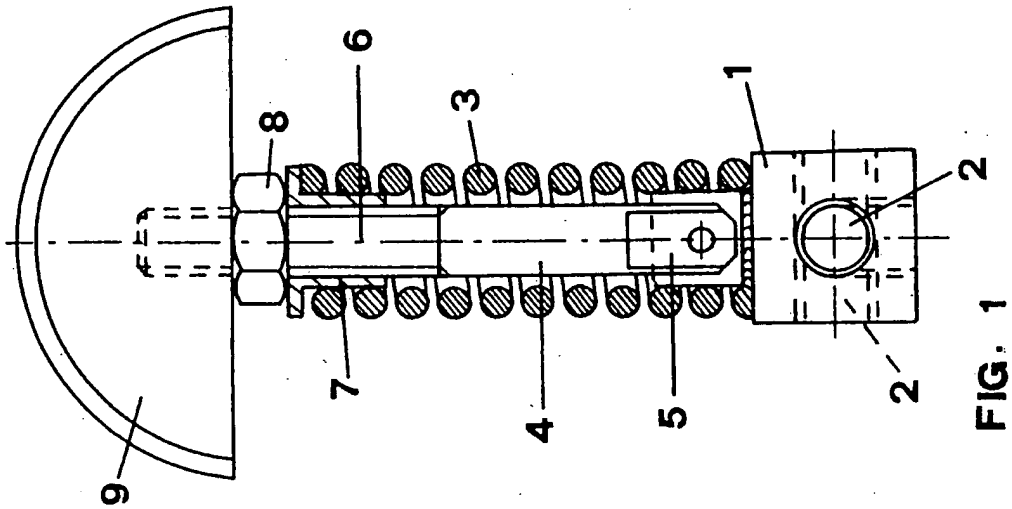

FIG. 1

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The present invention relates to an elastically d formable member, to be used in particular as a tensioning member for flexible motion-transmitting or conveyor means such as chains or belts.

While the member in reference can fulfil a great number of functions, for the sake of clarity reference will be only made in the following to the particular field of tensioning members for flexible motion-transmitting or conveyor means. Said member is therefore intended to be mainly used as a tensioning member for taking up changes in the length of chains, catenaries, and belts in machines. However, as said, it can be used in many other situations and cases in the mechanics, robotics and components field.

Chain and belt stretchers or tighteners that have been hitherto known can be divided into two main types: the first one is of the linear extension type in which the exerted thrust extends along a straight line, whereas the second type consists of lever stretchers which have the movable element capable of rotating about an arc of a circumference.

Tighteners of the known art have several different drawbacks depending upon the type.

Tighteners of the linear extension type substantially have the following drawbacks.

Due to the fact that they can only extend along a straight line, in the cases in which the available room is reduced they cannot be mounted. Actually, in very complicated machines involving many kinematic mechanisms disposed close to each other, just there is not enough room for mounting a tightener extending along a straight line. In this case in fact the flexible motion-transmitting means (chains or belts) to be stretched would be brought to inferfere with another member of the machine.

For a proper mounting linear tighteners need the use of at least two screws adapted to fasten the tightener body to the machine or a suitable support. An optimal situation would be on the contrary that in which a single securing screw can be used, which would save time in mounting. At all events this drawback is eliminated with the use of lever tighteners.

If linear tighteners are not mounted correctly, wear can occur in the course of time in the housing of the thrust columns. That is to say, if the force exerted by the chain or belt on the tightener is not in line with the tightener column, the column housing can be subjected to deformation.

Tighteners of the second type, that is lever tighteners, in which the lever is integral with a central body (provided with a threaded hole) into which a pair of springs or some rubber elements elastically counteracting the lever movement are introduced, have in turn the following drawbacks.

The type including the spring rubber elements cannot be used in situations in which the temperatur exceeds a given value (approximately 100°C).

They are very cumbersome because they need a very bulky body in order to hold the mover (springs or rubber lements).

The shaped head adapted to come in contact with the chain or belt to be tension d cannot be mount d sideways on the tightener lever, which involves a still greater bulkiness of the tightener itself.

Known tighteners can be rotated through a maximum angle of 30° to 45° depending upon the type.

They can only be mounted parallelly to the catenary running line. For example they cannot be mounted at right angles to the advancing direction of the chain or belt to be tensioned. Therefore, where there are particular requirements it is necessary to use a suitably shaped supporting bracket adapted to enable the tightener to be fastened according to the appropriate orientation.

In addition, there is also a loading problem connected with the inner springs on the mounting, due to the fact that the body does not have a conformation adapted to be grasped with a tool (a polygonal conformation for example) and therefore these tighteners are not very practical when the preloading operation is to be carried out.

The main object of the present invention is therefore to eliminate all cited drawbacks connected with known tighteners, by providing an elastically deformable member, in particular to be used as a tensioning member, capable of overcoming all drawbacks of the known art.

Another object of the invention is to provide an elastically deformable member, in particular to be used as a tensioning member, which is of very simple construction, relatively inexpensive and very reliable.

The foregoing and further objects are all achieved by the elastically deformable member of the invention, in particular to be used as a tensioning member for motion-transmitting and conveyor means, the main features of which are set forth in the accompanying claims.

Further features and advantages of the invention will become more apparent from the detailed description of two preferred embodiments thereof, given hereinafter by way of non-limiting example with reference to the accompanying drawings, in which:

- Fig. 1 is a partly sectional side view of the member of the invention according to one embodiment thereof, the member being provided with a chain head;
- Fig. 2 is a partly sectional side view of the member of the invention according to a second embodiment thereof, the member being provided with a chain head;
- Fig. 3 is anoth r view of the member represented in Fig. 1 where in dotted line the maximum permissible displacements thereof are shown;
- Figs. 4 to 7 represent the same member as shown in Fig. 2 where several examples of

maximum permissible displasements are shown in dotted lines;

– Figs. 8 and 9 are a front and side view respectively of the member shown in Fig. 1, provided with an in-line chain-stretching head;

– Figs. 10 and 11 are a front and side view respectively of the member shown in Fig. 1, provided with an offset chain-stretching head;

– Figs. 12 and 13 are a front and side view respectively of the member shown in Fig. 1 provided with an in-line geared head;

– Figs. 14 and 15 are a front and side view respectively of the member shown in Fig. 1 provided with an offset geared head;

– Figs. 16 and 17 are a front and side view respectively of the member shown in Fig. 1 provided with an in-line belt-stretching head;

– Fig. 18 and 19 are a front and side view respectively of the member shown in Fig. 1 provided with an offset belt-stretching head.

Referring to the drawings a polygonal base body, in this case in the form of a cube, has been generally identified by reference numeral 1. On its accessible faces the body 1 is provided with threaded through holes 2 adapted to receive screws (not shown) for its being fastened to a machine or a support (not shown).

Denoted by 3 is a helical spring defining an inner cylindrical void inside which, according to the first embodiment shown in Fig. 1, a rectilinear rod 4 is housed which is hinged at the base to a fork 5 fastened to the body 1, and exhibiting a cylindrical threaded stem 6 at the top thereof.

A bushing 7 provided with a collar and locked by a nut 8 screwed to the stem 6 is interposed between the spring 3 and stem 6 in order to eliminate the existing slacks.

Fastened to the stem 6 top is a shaped head 9 adapted to act upon a driving chain or a conveyor chain (not shown) causing it to be tensioned.

In accordance with this first configuration shown in Fig. 1 the chain-stretcher can be rotated sideways as far as it reaches an inclination of about 30°. This situation is shown in Figs. 3, 8, 10, 12, 14, 16 and 18.

In accordance with a second embodiment shown in Fig. 2 the rectilinear rod 4 is replaced by a chain 10 which is hinged at the base to the fork 5 and fastened at the top to the stem 6.

This conformation enables the tightener to be rotated sideways as far as various inclinations are reached, as shown in Figs. 4 to 7. More particularly: a rotation through 90° is shown in Fig. 4; a rotation through 180° is shown in Fig. 5; a rotation through 270° is shown in Fig. 6 and a rotation through 360° is shown in Fig. 7.

Examples of shaped heads adapted to be applied to the stem 6 top have been shown in Figs. a to 19.

In greater detail: a chain head 9 disposed in line has been shown in Figs. a and 9; Figs. 10 and 11 show an offset chain h ad 11 carried by a support 12 (on which th head 11 can take different positions); Figs. 12 and 13 show a circular geared head 13 disposed in line; the head shown in Figs. 14 and 15 is an offset geared head 14 carried by a support 15; Figs. 16 and 17 show a belt-stretching head 16 disposed in line and Figs. 18 and 19 show an offset belt-stretching head 17 carried by a support 18.

The deformable member in question when used as a tensioning member and in particular as a chain- or belt-stretcher, exhibits the following advantages as compared with the above mentioned known tensioning members:

– a very reduced bulkiness with respect both to tighteners of the linear extension type and traditional lever tighteners;

– it does not need the presence of orientation brackets in that the fastening of the polygonal body 1 can take place indifferently on any of its faces;

– in all embodiments of the shaped head 9, 11, 13, 14, 16 and 17 it is possible to select any intermediate position in the work orientation of the head itself within the range of 360° by loosening the fastening between the head and the stem 6;

– by suitably lengthening the chain 10 and spring 3 external thereto, inclinations included within the range of 360° and beyond this limit can be reached at will;

– no temperature problem exist since the member is completely made of metal;

– tighteners constructed as above can be combined with one another so as to form tightener sets, and to this end the conformation of the polygonal body 1 and the presence of holes 2 is utilized;

– the shaped head 9, 13 and 16 can be disposed perfectly in line with the rectilinear rod 4 and, as a result, all efforts are discharged onto the body 1 without any deformation or wear of the components being produced.

It is also to be noted that, by using the member in question as an elastically deformable member (that is not exactly as a tensioning member and therefore devoid of the shaped head 9) it is possible to create more or less complicated structural combinations formed with said members connected to one another, by virtue of the presence of the polygonal body 1 provided with holes 2 and the presence of the threaded stem 6 which can be screwed in said holes 2. In this way many spring structures designed for the most varied uses can be achieved.

The invention attains the intended purposes.

Obviously on carrying out the invention shapes and configurations different from those described above can be adopted without departing from the present protection scope.

In addition, all of the details may be replaced by

technically equivalent elements and the siz s, shapes and materials used may be of any nature and magnitude, depending upon requirements.

Claims

1. An elastically deformable member, in particular a tensioning member for flexible motion-transmitting and conveyor means, characterized in that it comprises a polygonal base body (1) provided with holes (2) disposed on the faces thereof, to which a spring element carrying a cylindrical threaded stem (6) at the top, is fastened.

2. A deformable member according to claim 1, characterized in that said spring element is a helical spring (3).

3. A deformable member according to claim 2, characterized in that located in the cylindrical void defined by said helical spring (3) is a rectilinear rod (4) hinged at the base to a fork (5) fastened to said polygonal body (1) and exhibiting said cylindrical threaded stem (6) at the top thereof.

4. A deformable member according to claim 2, characterized in that located in the cylindrical void defined by said helical spring (3) is a chain (10) articulated at the base to a fork (5) secured to said polygonal body (1) and fastened at the top to said cylindrical threaded stem (6).

5. A deformable member according to claim 3 or 4, characterized in that a bushing (7) provided with a collar and locked by a nut (8) screwed to said threaded stem (6) is interposed between said cylindrical threaded stem (6) and said helical spring (3).

6. A deformable member according to claim 1 or claims 2 to 5, characterized in that a shaped head (9, 11, 13, 14, 16, 17) adapted to act on said flexibile motion-transmitting or conveyor means can be associated with said cylindrical threaded stem (6).

7. A deformable member according to claim 1 or claims 2 to 6, characterized in that said polygonal base body (1) is of substantially cubic form.

8. A deformable member according to claim 1 or claims 2 to 7, characterized in that said holes (2) located on the faces of said polygonal body (1) are threaded holes.

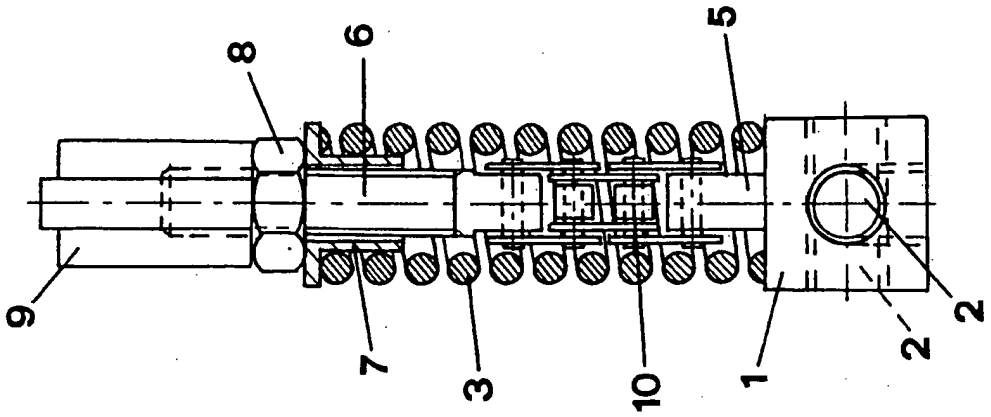

FIG. 2

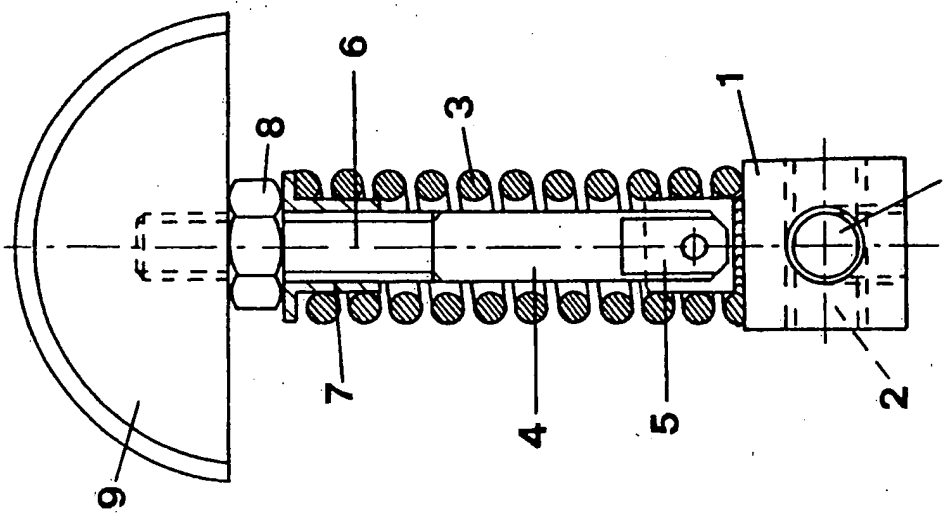

FIG. 1

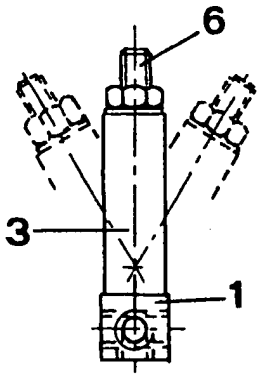

FIG. 3

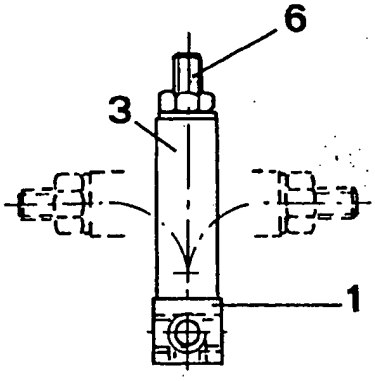

FIG. 4

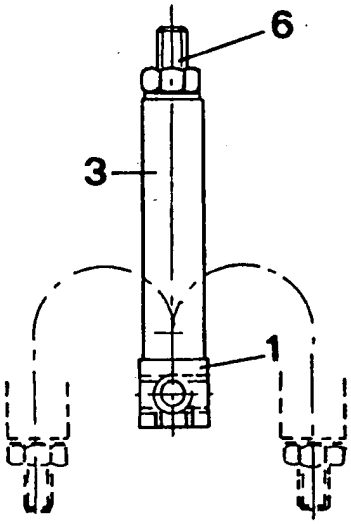

FIG. 5

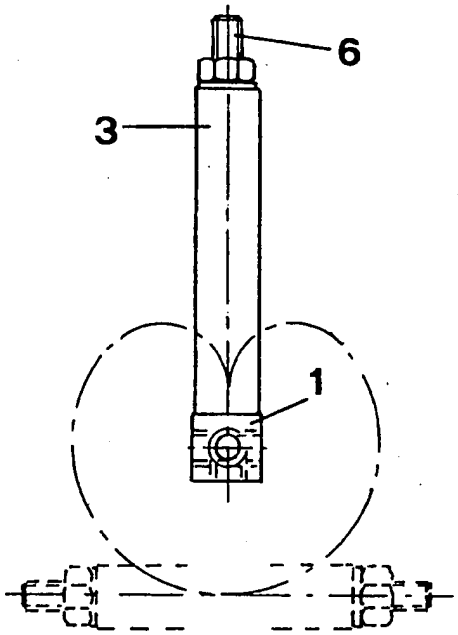

FIG. 6

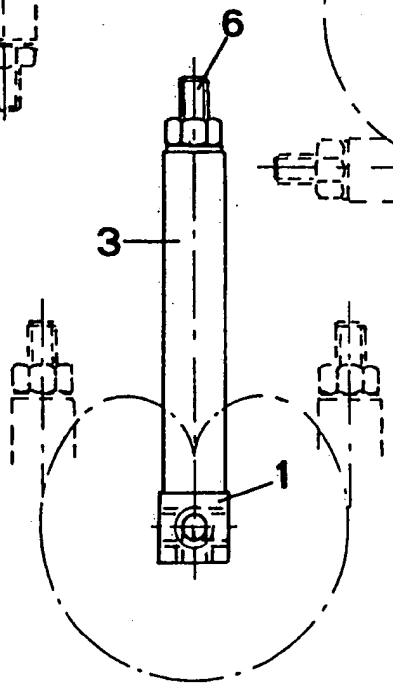

FIG. 7

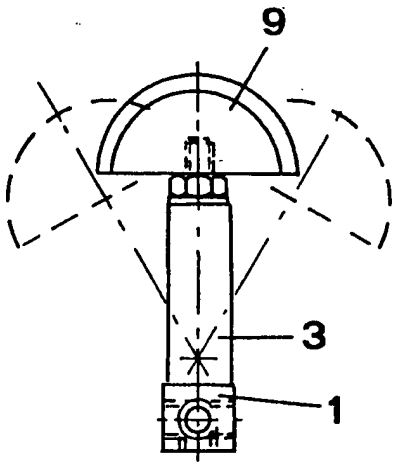

FIG. 8

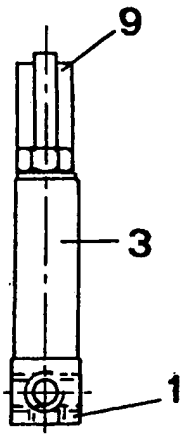

FIG. 9

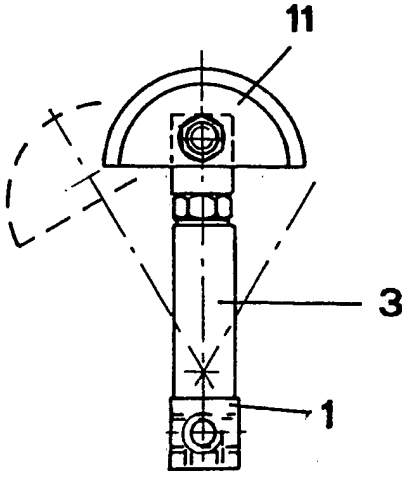

FIG. 10

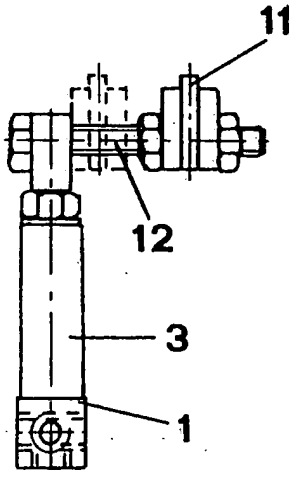

FIG. 11

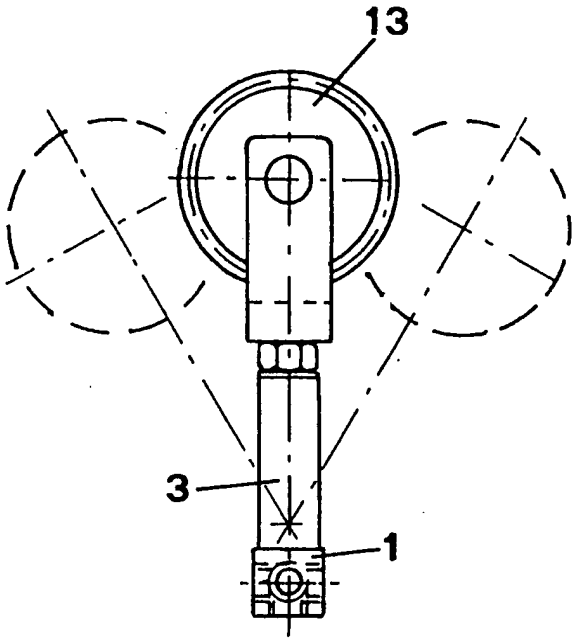

FIG. 12

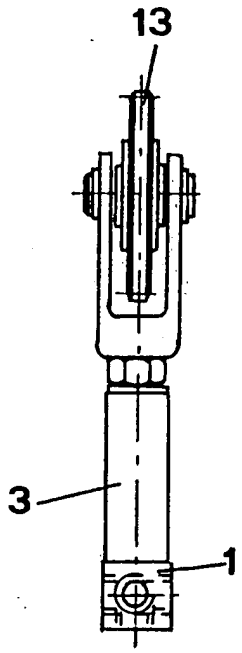

FIG. 13

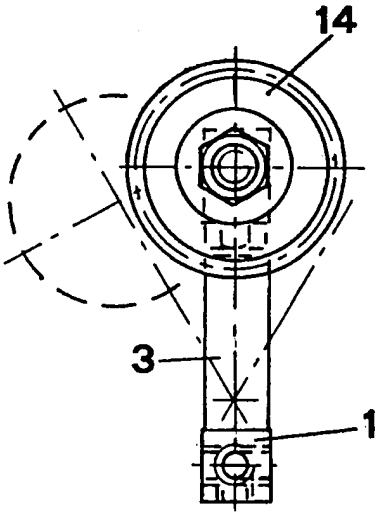

FIG. 14

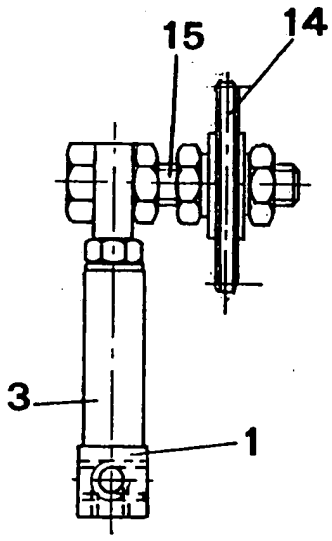

FIG. 15

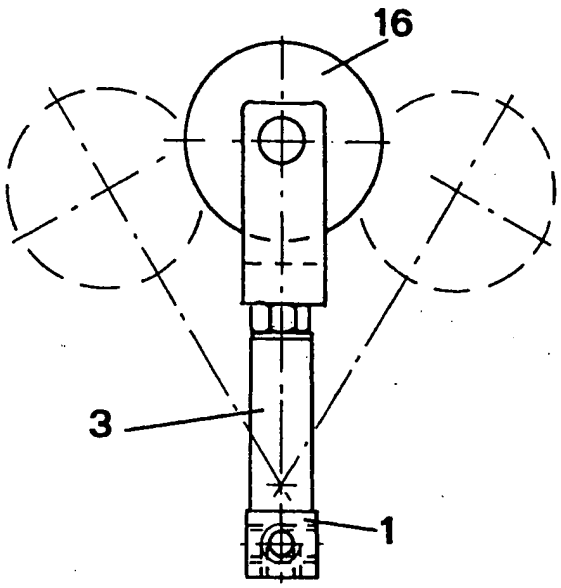

FIG. 16

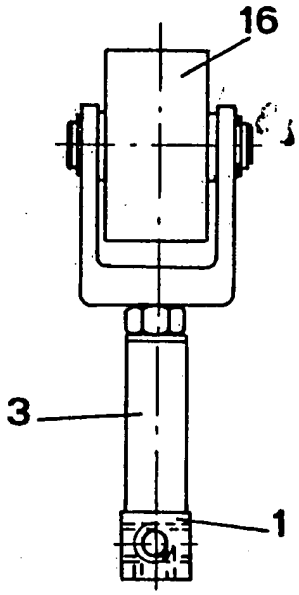

FIG. 17

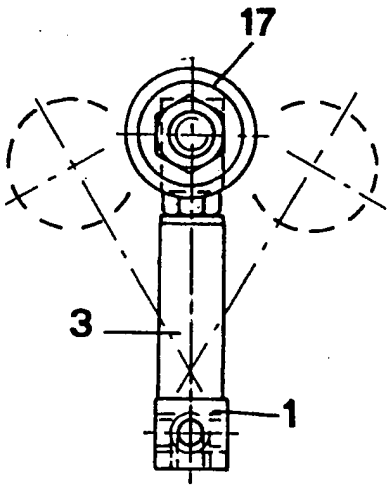

FIG. 18

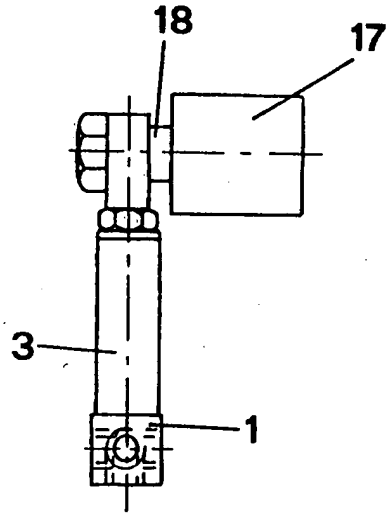

FIG. 19

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 83 0321

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	EP-A-0086522 (DE ROTTERDAMSCHE DROOGDOK MAATSCHAPPIJ) * page 2, lines 13 - 29; figure 1 *	1	F16H7/08 B65G23/44
A	GB-A-1300910 (SULZER BROTHERS) * figures 1, 2 *	1	
A	GB-A-1175951 (BREWER) * figures 1-4 *	1	
A	CH-A-279415 (LANCIA & C.) * page 2, lines 61 - 64; figure 4 *	1, 2	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B65G
F16H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	04 DECEMBER 1991	SIMON, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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